Listen to the Hardware, A Case Study in Missed Opportunities

Leadership ViTS Meeting

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The Safety Analysis

- In 1969 per FAA requirements, Douglas, manufacturer of DC-10, asked the Convair Division of General Dynamics, a subcontractor, to perform Failure Modes and Effects Analysis (FMEA) of the DC-10 cargo door system.
- The FMEA uncovered nine sequences that would potentially threaten life. Four of these involved sudden depressurization in flight.
- One of the four sequences was failure of the locking pin system causing the door lock not to latch when the door was closed. As a result of this sequence, the door could fly open in flight causing sudden depressurization and possible structural failure of the floor and damage to the tail.

DC-10 Certification

- The draft FMEA was modified by Douglas to minimize design deficiency.
- A ground test failure in May 1970 was blamed on human error. In retrospect, poor design was downplayed as a root cause.
- During November 1970, internal memos between Convair and Douglas discussed proposed fixes to the cargo door problem but none was implemented.
- The FAA certified the DC-10 on July 29, 1971 with an unsolved design deficiency.

A High Visibility Close Call

- On June 12, 1972, the cargo door of an American Airlines DC-10 in flight from Los Angeles to New York burst open at 11,500 feet because of a cargo door locking pin failure. It resulted in decompression of the aircraft and temporary loss of control of the aircraft. Skillful and heroic acts by the crew resulted in safe landing and no fatalities.
- Per NTSB investigation results, FAA drafted an order that would have grounded the DC-10 until the needed design changes were made.
- In the famous “Midnight Gentlemen's Agreement,” the President of Douglas convinced the FAA Administrator not to ground the DC-10.

The Accident

- In March 3, 1974, a Turkish Airline DC-10 crashed in France killing all 346 people aboard. The cause of the accident was faulty latches on the cargo door which allowed the differential pressure in the cabin at 11,500 feet altitude to force the door to swing open to the outside of the plane where it was ripped open off its hinges by the air stream.
- After this accident, the entire DC-10 fleet was finally grounded and the cargo door locking system was redesigned and the problem eliminated.

Lessons Learned

- A safety analysis is no better than the system we have in place to deal with it.
- A test failure that does not go to root cause is a missed opportunity to prevent future mishaps.
- A close call should be treated as an opportunity to prevent a mishap.
- Risk management is about mitigating risks while their probability of occurrence is still less than 1 !

"Destination Disaster," a book by Paul Eddy, details the events of this major accident.